

CLAIMS

I Claim:

1 1. An authoring tool that assists an author in building an automated
2 diagnostic system for a product, the authoring tool comprising:
3 a cause editor interface that allows an author to place, in a cause data
4 structure, information pertaining to causes;
5 an action editor interface that allows an author to place, in an action
6 data structure, information pertaining to actions that can be taken in
7 response to the causes; and
8 a question editor interface that allows an author to place, in a question
9 data structure, information pertaining to questions that can be asked a user
10 of the product to help identify causes.

1 2. An authoring tool as in claim 1 wherein the authoring tool
2 additionally comprises a library of modules, at least one of the modules
3 containing diagnostic information about a component of the product.

1 3. An authoring tool as in claim 2 wherein the author can save the
2 library of modules to a disk storage device, load the library of modules from
3 the disk storage device and create a new library of modules.

1 4. An authoring tool as in claim 2 wherein the author can select
2 modules from the library of modules when building the automated diagnostic
3 system for the product.

1 5. An authoring tool as in claim 4 wherein the author can create new
2 modules and delete modules.

1 6. An authoring tool as in claim 5 wherein the author can rename
2 modules and import modules from other libraries of modules.

1 7. An authoring tool as in claim 1 wherein information pertaining to a
2 cause relates to the following categories:

3 name of the cause;
4 parent of the cause;
5 explanation of the cause; and,
6 probability of the cause being present.

1 8. An authoring tool as in claim 7 wherein the information pertaining
2 to the cause additionally relates to the following categories:
3 category of the cause;
4 dependency on environment; and,
5 indication that a customer is not to access information pertaining to the
6 cause.

1 9. An authoring tool as in claim 1 wherein information pertaining to
2 an action relates to the following categories:
3 name of the action;
4 explanation of the action;
5 causes solved by the action;

6 probabilities that the action solves specified causes
7 an indication whether the action is for information-gathering or is a
8 potential solution;
9 costs of taking the action; and,
10 trustworthiness of an answer to the action.

1 10. An authoring tool as in claim 9 wherein the information pertaining
2 to the action additionally relates to the following categories:
3 an indication as to whether the action should be taken before other
4 actions;
5 an indication as to whether the action is a workaround;
6 additional actions included with the action;
7 whether the action can only be performed after a specified question has
8 been answered; and,
9 whether the action cannot be performed after a specified question has
10 been answered.

1 11. An authoring tool as in claim 1 wherein information pertaining to a
2 question relates to the following categories:
3 name of the question;
4 explanation of the question;
5 number of answers;
6 names of answers;
7 costs of finding an answer to the question; and,
8 trustworthiness of the answer to the question.

1 12. An authoring tool as in claim 11 wherein the information
2 pertaining to the question additionally relates to the following categories:

3 whether the question can only be performed after a specified question
4 has been answered;

5 whether the question cannot be performed after a specified question
6 has been answered;

7 an indication as to whether the question should be asked before other
8 questions; and,

9 whether the question is a symptom question or a general question.

1 13. An authoring tool as in claim 11 wherein information pertaining to
2 the question particularly pertains to a symptom question and additionally
3 relates to the following categories:

4 causes of a symptom;

5 probability of answers to the question conditional on causes that can
6 cause the symptom; and,

7 probability of answers to the question conditional on no causes that can
8 cause the symptom.

1 14. An authoring tool as in claim 11 wherein information pertaining to
2 the question particularly pertains to a general question and additionally
3 relates to the following categories:

4 prior probabilities of answers to the question;

5 causes that are affected by answers to the question; and,

6 probability of the affected causes conditional on each answer to the
7 question.

1 15. An authoring tool as in claim 1 wherein:
2 the cause editor interface additionally allows an author to create new
3 cause entries;
4 the action editor interface additionally allows an author to create new
5 action entries; and
6 the question editor interface additionally allows an author to create
7 new question entries.

1 16. An authoring tool as in claim 1 wherein:
2 the cause editor interface additionally allows an author to edit existing
3 cause entries;
4 the action editor interface additionally allows an author to edit existing
5 action entries; and
6 the question editor interface additionally allows an author to edit
7 existing question entries.

1 17. An authoring tool as in claim 1 wherein:
2 the cause editor interface additionally allows an author to delete
3 existing cause entries;
4 the action editor interface additionally allows an author to delete
5 existing action entries; and

the question editor interface additionally allows an author to delete existing question entries.

18. An authoring tool that assists an author in building an automated diagnostic system, the authoring tool comprising:

a cause editor interface that allows an author to place, in a cause data structure, information pertaining to causes, wherein for a cause the information relates to the following categories:

name of the cause,
parent of the cause,
explanation of the cause, and
probability of the cause being present.

19. An authoring tool as in claim 18 wherein the information pertaining to the cause additionally relates to the following categories:

cause category,
dependency on environment, and
indication that a customer is not to access the information pertaining to the cause.

20. An authoring tool that assists an author in building an automated diagnostic system, the authoring tool comprising:

an action editor interface that allows an author to place, in an action data structure, information pertaining to actions that can be taken, wherein for an action the information relates to the following categories:

name of the action,
explanation of the action,
causes solved by the action,
probabilities that the action solves specified causes,
an indication whether the action is for information-gathering or
is a potential solution,
costs of taking the action, and
trustworthiness of an answer to the action,

21. An authoring tool as in claim 20 wherein the information
pertaining to the action additionally relates to the following categories:
an indication as to whether the action should be taken before other
actions,
an indication as to whether the action is a workaround;
additional actions included with the action,
whether the action can only be performed after a specified question has
been answered, and
whether the action cannot be performed after a specified question has
been answered.

22. An authoring tool that assists an author in building an automated
diagnostic system, the authoring tool comprising:
a question editor interface that allows an author to place, in a question
data structure, information pertaining to questions that can be asked a user

to help identify causes, wherein for a question the information relates to the following categories:

- name of the question,
- explanation of the question,
- number of answers,
- names of answers,
- costs of finding an answer to the question, and
- trustworthiness of an answer to the question.

23. An authoring tool as in claim 22 wherein the information pertaining to the question additionally relates to the following categories:

- whether the question can only be performed after a specified question has been answered;
- whether the question cannot be performed after a specified question has been answered;
- an indication as to whether the question should be taken before other questions; and,
- whether the question is a symptom question or a general question.

24. An authoring tool as in claim 22 wherein information pertaining to the question particularly pertains to a symptom question and additionally relates to the following categories:

- causes of a symptom;
- probability of answers to the question conditional on causes that can cause the symptom; and,

probability of answers to the question conditional on no causes that can cause the symptom.

25. An authoring tool as in claim 22 wherein information pertaining to the question particularly pertains to a general question and additionally relates to the following categories:

prior probabilities of answers to a question;
causes that are affected by answers to the question; and,
probability of the affected causes conditional on each answer to the question.

26. An authoring tool that assists an author in building an automated diagnostic system, the authoring tool comprising:

a diagnostic system model editor interface that allows the author to place in a diagnostic system model structure, information pertaining to diagnosis; and,

a library module editor interface that allows the author to place in a library data structure information pertaining to modules corresponding with components of a product.

27. An authoring tool as in claim 26 wherein the information pertaining to modules corresponding with components of the product comprises:

name of a component of a module;
causes of the component malfunctioning;

actions that can resolve malfunctioning of the component; and,
questions that can provide information about the causes of the
component malfunctioning.

28. An authoring tool as in claim 26 wherein the information
pertaining to diagnosis comprises:
name of a problem;
causes of the problem;
actions that can help resolve the problem;
questions that can provide information about the problem; and,
an amount of time required to observe whether the problem is present.

29. An authoring tool as in claim 26 wherein the author can create a
new diagnostic system model, load diagnostic system models from disk
storage, save the diagnostic system models to the disk storage such that the
diagnostic system models can be run by external diagnostic system software,
save the diagnostic system models in text format, and print a diagnostic
system model in text format.

30. An authoring tool as in claim 26 wherein the author can export
causes, actions and questions from a current diagnostic system model to a
current library module, and export causes, actions and quests form the
current library module to the current diagnostic system model.

1 31. An authoring tool as in claim 27 wherein the author can get an
2 overview of all causes in the library data structure for quick lookup and
3 insertion, get an overview of all actions in the library data structure for quick
4 lookup and insertion, and get an overview of all questions in the library data
5 structure for quick lookup and insertion.

1 32. An authoring tool as in claim 31 wherein the author can add new
2 categories of causes to the modules, and look up causes that fall into specific
3 categories.

1 33. An authoring tool as in claim 26 wherein the author can view
2 causes in a tree structure, specify sets of probabilities for each level of causes
3 in the tree structure, and normalize the probabilities on each level of causes
4 in the tree structure.

1 34. An authoring tool that assists an author in building an automated
2 selection system, the authoring tool comprising:
3 a selection editor interface that allows an author to place, in a selection
4 data structure, information pertaining to selections;
5 an action editor interface that allows an author to place, in an action
6 data structure, information pertaining to actions that can be taken in
7 response to the selections; and
8 a question editor interface that allows an author to place, in a question
9 data structure, information pertaining to questions that can be asked a user
10 of the product to help identify selections.

1 35. An authoring tool that assists an author in building an automated
2 decision support system, the authoring tool comprising:
3 a situation editor interface that allows an author to place, in a
4 situation data structure, information pertaining to situations;
5 an action editor interface that allows an author to place, in an action
6 data structure, information pertaining to actions that can be taken in
7 response to the situations; and
8 a question editor interface that allows an author to place, in a question
9 data structure, information pertaining to questions that can be asked a user
10 of the product to help identify situations.